Motion Lab

Pre-Lab Questions:

- 1. Define the following terms:
 - a. Kinematics:
 - b. Speed/Velocity:
 - c. Acceleration:
 - d. Deceleration:
- 2. What are the differences between speed, velocity, acceleration and deceleration?

3. How do you calculate speed/velocity?

4. How do you average speed?

5. How do you calculate acceleration?

6. What are the units of measurement for speed/velocity and acceleration calculations?

Hypothesis: create an "If...then..." statement for this lab.

Materials:

- 1. Stopwatch
- 2. Chalk or masking tape
- 3. Tape measure
- 4. Graph paper
- 5. Object to move (some options):
 - a. Yourself walking, running, swimming, etc.
 - b. Toy car

- c. Ball
- 6. Ramp: to push the toy car or ball down OR smooth surface

Procedure:

Step 1:

- 1. Using your chalk or measuring tape mark off your starting and stopping distance. How long your overall distance is will depend on the type of motion you choose.
- 2. Practice the motion of your choice and try to keep it at a constant rate
- 3. Time the motion: start the stopwatch as soon as the motion starts and stop it as soon as the motion hits the final mark of distance
- 4. Take notes on the steps you took to keep the motion constant and record data in data table 1, below
- 5. Graph data points, speed versus time

Step 2:

- 6. For this part of the lab you will be testing acceleration; recommend that you complete at least 2 practice trials
- 7. Using your chalk or measuring tape mark off 4 equal distances apart. For example: 0m, 6m, 12m, 18m, 24m or 0cm, 6cm, 12cm, 18cm, 24cm depending on the motion
- 8. Start at your zero mark and begin the motion; the goal is to see if acceleration occurs
- 9. Time the motion: start the stopwatch as soon as the motion starts and stop it as soon as the motion hits the final mark of distance
- 10.Each time the object in motion hits the 4 equal distances record the time in data table 2
- 11.Calculate average speed and acceleration and record in data table 2
- 12.To challenge yourself, repeat the above steps for step 2 and instead of accelerating, deccerlate

Data Table 1:

Average speed:

Distance (unit)	Time (sec)	Speed (unit/sec)	Notes/Observations

Data Table 2:

Distance (unit)	Time (sec)	Notes/Observations
0	0	

Show calculations below for:

• Average speed:

- Final speed:
- Acceleration:

Post-Lab Questions:

1. Referring to your data, describe the mathematical relationship between time and speed/velocity?

2. What was the bigger challenge, to keep the object in a consistent motion or accelerating it?